Variability survey in the young open cluster NGC 457

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Abstract We present preliminary results of the photometric variability search in the field of view of the young open cluster NGC 457. We find over 60 variable stars in the field, including 25 pulsating or candidate pulsating stars.

1 The cluster

NGC 457 is a young open cluster in Cassiopeia, nearby ϕ Cas. Its age is estimated for 10–20 Myr [3, 1], distance, for about 2.5–3.0 kpc. It is located in the Perseus arm of the Galaxy. Six variable or suspected variable stars were known in the observed cluster field prior to our study (see, e.g., [2]). We present preliminary results of the photometric variability survey in this cluster aimed at discovery of B-type pulsating stars and bright eclipsing binaries.

2 Observations and results

The photometric observations of NGC 457 were obtained during three runs: the run consisting of 4 nights in 1993 carried out in Ostrowik station, University of Warsaw, by one of us (GK), the second run of 31 nights in the years 1999–2002 (Białków station, University of Wrocław) and the third one consisting of 24 nights made again in Białków between December 2010 and March 2011. Here, we present results based on the 2010–2011 observations only. Of the three runs, the last one is of the best quality. During this run we used 60-cm reflecting telescope equipped with the Andor Tech. DW 432-BV CCD camera covering $13' \times 12'$ field of view. All

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frames were calibrated in a standard way and reduced with the Daophot II package [4].

We have found 64 variable stars in the observed field, including the six already known. The most interesting is the discovery of pulsating stars, likely members of the cluster. The sample of pulsating stars includes: a single β Cephei star NGC 457-8 (see Fig. 1), 12 (candidate) SPB stars and 12 δ Scuti stars. In addition, nine eclipsing and ellipsoidal variables were found. The sample includes also stars showing irregular or (quasi)periodic variations of unknown origin both in the cluster main sequence and among the reddest stars in the field. Some of B-type stars showing this type of variability are known as Be stars.

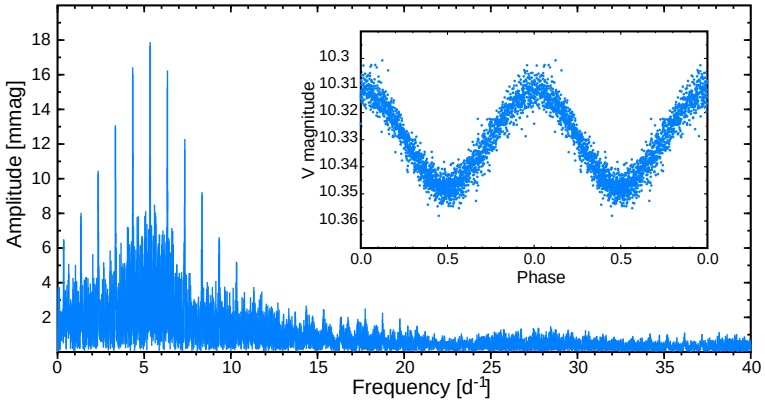

Fig. 1 Fourier amplitude spectrum for the V-filter data of β Cephei star NGC 457-8. The inset shows the light curve phased with the main period.

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